

Claims

- [c1] An antenna arrangement for installation under a dielectric cover of a vehicle, comprising:
a first loop having first and second conductor sections of substantially equal length, and a capacitor, each conductor section having one end with an antenna feed line connector and the other end connected to one side of the capacitor, wherein the length of the first and second conductor sections is sufficient to resonate in the FM frequency range and wherein the capacitor has a predetermined value of capacitance to block frequencies in the AM range, and
a probe, coplanar with the first loop, connected to the first section, and having sufficient length to effectively enhance AM reception from the first and second conductor sections.
- [c2] An antenna arrangement according to claim 1 and further comprising an L-C circuit between the probe and the first section.
- [c3] An antenna arrangement according to claim 2 wherein the first loop is square.

- [c4] An antenna arrangement according to claim 3 wherein the probe comprises more than one segment.
- [c5] An antenna arrangement according to claim 4 wherein the segments are normal to each other.
- [c6] An antenna arrangement according to claim 5 wherein the probe comprises four segments.
- [c7] An antenna arrangement according to claim 6 wherein each of the segments is parallel to a conductor section.
- [c8] An antenna arrangement according to claim 7 and further comprising a second probe coplanar with the first loop, connected to the first conductor section and having a length sufficient to resonate at the weatherband frequency.
- [c9] An antenna arrangement according to claim 8 and further comprising an L-C circuit between the second probe and the first conductor section.
- [c10] An antenna arrangement according to claim 1 wherein the probe is connected to the first conductor section near the antenna feed line connector.
- [c11] An antenna arrangement according to claim 10 and further comprising an L-C circuit between the probe and the first conductor section.

- [c12] An antenna arrangement according to claim 11 wherein the first loop is square.
- [c13] An antenna arrangement according to claim 12 wherein the probe comprises more than one segment.
- [c14] An antenna arrangement according to claim 13 wherein the segments are normal to each other.
- [c15] An antenna arrangement according to claim 14 wherein the probe comprises four segments.
- [c16] An antenna arrangement according to claim 15 wherein each of the segments is parallel to a conductor section.
- [c17] An antenna arrangement according to claim 16 and further comprising a second probe coplanar with the first loop, connected to the first section and having a length sufficient to resonate at the weatherband frequency.
- [c18] An antenna arrangement according to claim 17 and further comprising an L-C circuit between the second probe and the first conductor section.
- [c19] An antenna arrangement according to claim 1 wherein the probe is connected to the first conductor section near the capacitor.
- [c20] An antenna module comprising:

a planar dielectric substrate;
a first loop mounted to the substrate and having first and second conductor sections of substantially equal length, and a capacitor, each conductor section having one end with an antenna feed line connector and the other end connected to one side of the capacitor, wherein the length of the first and second conductor sections is sufficient to resonate in the FM frequency range and wherein the capacitor has a predetermined value of capacitance to block frequencies in the AM range, and
a probe, mounted to the substrate substantially coplanar with the first loop, connected to the first conductor section, and having sufficient length to effectively enhance AM reception from the first and second conductor sections.

[c21] An antenna module comprising:
a planar dielectric substrate;
a first probe mounted to the substrate;
a second probe mounted to the substrate normal to and shorter than the first probe; and
a coiled probe mounted to the substrate coplanar with the first and second probes, and within the angle formed between the first and second probes,
wherein the first and second probes and the coiled probe

are each connected to a single feed point and the coiled probe comprises multiple turns, no turn extending beyond the length of either the first or second probes.

[c22] The antenna arrangement of claim 21 wherein each turn of the coiled probe and the first and second probes are equidistantly spaced from another of the turns of the coiled probe or the first and second probes.

[c23] The antenna arrangement of claim 21 and further comprising a ground lead connected to the feed point.

[c24] The antenna arrangement of claim 21 wherein the first probe has sufficient length to resonate in the FM frequency range, the second probe has sufficient length to resonate in the WB frequency range and the coiled probe has sufficient length to effectively function as an AM antenna.

[c25] The antenna arrangement of claim 24 wherein the length of each of the probes and the coiled probe is less than one quarter wavelength of its corresponding frequency midrange.